

### **Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1-30. (Cancelled)

### **CLAIMS**

31. (New) Apparatus for use in monitoring particles in a liquid flow, comprising:  
a duct in the form of a pipe section for receiving the liquid flow;

light generating means adjacent the pipe section for transmitting light into the liquid flow via a first at least partially light-transmissive part of the pipe section;

light-responsive detection means adjacent a second at least partially light-transmissive part of the pipe section for receiving light from the light generating means which has passed through the liquid flow;

processing means for location remotely from said pipe section;

means for coupling the processing means with the detection means, the processing means being adapted for processing signals therefrom to provide data relating to particles in the liquid flow;

wherein inside said pipe section, each of said first and second at least partially light-transmissive parts has a non-stick coating.

- 32. (New) Apparatus according to claim 31, wherein said pipe section is provided with means for mounting it in a run of pipework.
- 33. (New) Apparatus according to claim 31, wherein said first and second at least partially light-transmissive parts comprise first and second windows in a wall of the pipe section.
- 34. (New) Apparatus according to claim 31, wherein said first and second at least partially light-transmissive parts are diametrically opposite each other.
- 35. (New) Apparatus according to claim 31, wherein said pipe section is provided with means for flushing away deposits from each of said first and second at least partially light-transmissive parts inside the pipe section.
- 36. (New) Apparatus according to claim 35, wherein said flushing means is located downstream of said first and second at least partially light-transmissive parts.
- 37. (New) Apparatus according to claim 35, wherein said flushing means comprises, for each of said first and second at least partially light-transmissive parts, a respective nozzle for directing a flushing liquid at the respective part from inside the pipe section.

38. (New) Apparatus according to claim 31, wherein said light-responsive detection means comprises a television camera.
39. (New) Apparatus according to claim 38, wherein said camera is provided with a lens and frame grabbing means for capturing one magnified single image at a time, focussed inside said pipe section, the signals received by said processing means representing successive captured images from said grabbing means.
40. (New) Apparatus according to claim 31, wherein said processing means provides data relating to the amount and/or size distribution of particles of a predetermined kind in the liquid flow.
41. (New) Apparatus according to claim 31, wherein the surface of said first at least partially light-transmissive part inside said pipe section is uneven for reducing deposit build-up on said surface.
42. (New) Apparatus according to claim 31, including a plurality of such light-responsive detection means.
43. (New) Apparatus according to claim 42, wherein only one of said light-responsive detection means is used at a time.
44. (New) Apparatus according to claim 42, wherein each of said light-responsive

detection means receives light from said second at least partially light-transmissive part.

- 45. (New) Apparatus according to claim 31, wherein there is a plurality of such first at least partially light-transmissive parts.
- 46. (New) Apparatus according to claim 45, wherein there is a plurality of such second at least partially light-transmissive parts, each of which is associated with a respective one of said first at least partially light-transmissive parts.
- 47. (New) Apparatus according to claim 46, including a plurality of such light-responsive detection means, wherein each of said light-responsive detection means receives light from a respective one of said second at least partially light-transmissive parts.
- 48. (New) Apparatus according to claim 45, wherein said pipe section is provided with means for flushing away deposits from each of said first and second at least partially light-transmissive parts inside the pipe section and wherein each of said first and second at least partially light-transmissive parts is associated with respective such flushing means.
- 49. (New) Apparatus according to claim 31, wherein there is a plurality of such light generating means.

50. (New) Apparatus according to claim 49, wherein only one of said light generating means is used at a time.
51. (New) Apparatus according to claim 49, wherein there is a plurality of such first at least partially light-transmissive parts and wherein each of said light generating means is associated with a respective one of said first at least partially light-transmissive parts.
52. (New) Apparatus according to claim 31, with said pipe section mounted in pipework for conveying the liquid flow, the processing means being located at a location remote therefrom and the coupling means coupling the processing means and the light-responsive detection means.
53. (New) Apparatus according to claim 52, wherein said pipework is for conveying water into a well in a hydrocarbon production system.
54. (New) Apparatus according to claim 53, wherein said pipe section, the first and second light-transmissive parts, the light generating means and the light-responsive means are sub-sea.
55. (New) Apparatus according to claim 54, wherein said remote location is a topside platform.
56. (New) Apparatus for use in monitoring particles in a liquid flow, comprising:

a pipe section for receiving the liquid flow;

light generating means adjacent the pipe section for transmitting light into the liquid flow via a first at least partially light-transmissive part of the pipe section;

light-responsive detection means adjacent a second at least partially light-transmissive part of the pipe section for receiving light from the light generating means which has passed through the liquid flow;

processing means for location remotely from said pipe section; and

means for coupling the processing means with the detection means, the processing means being adapted for processing signals therefrom to provide data relating to particles in the liquid flow;

wherein said pipe section is provided with means for flushing away deposits from each of said first and second at least partially light-transmissive parts inside the pipe section.

57. (New) Apparatus according to claim 56, wherein said pipe section is provided with means for mounting it in a run of pipework.
58. (New) Apparatus according to claim 56, wherein said first and second at least partially light-transmissive parts comprise first and second windows in a

wall of the pipe section.

59. (New) Apparatus according to claim 56, wherein said first and second at least partially light-transmissive parts are diametrically opposite each other.

60. (New) Apparatus according to claim 56, wherein inside said pipe section, each of said first and second at least partially light-transmissive parts has a non-stick coating.

61. (New) Apparatus according to claim 56, wherein said flushing means is located downstream of said first and second at least partially light-transmissive parts.

62. (New) Apparatus according to claim 56, wherein said flushing means comprises, for each of said first and second at least partially light-transmissive parts, a respective nozzle for directing a flushing liquid at the respective part from inside the pipe section.

63. (New) Apparatus according to claim 56, wherein said light-responsive detection means comprises a television camera.

64. (New) Apparatus according to claim 63, wherein said camera is provided with a lens and frame grabbing means for capturing one magnified single image at a time, focussed inside said pipe section, the signals received by said processing means representing successive captured images

from said grabbing means.

- 65. (New) Apparatus according to claim 56, wherein said processing means provides data relating to the amount and/or size distribution of particles of a predetermined kind in the liquid flow.
- 66. (New) Apparatus according to claim 56, wherein the surface of said first at least partially light-transmissive part inside said pipe section is uneven for reducing deposit build-up on said surface.
- 67. (New) Apparatus according to claim 56, including a plurality of such light-responsive detection means.
- 68. (New) Apparatus according to claim 67, wherein only one of said light-responsive detection means is used at a time.
- 69. (New) Apparatus according to claim 67, wherein each of said light-responsive detection means receives light from said second at least partially light-transmissive part.
- 70. (New) Apparatus according to claim 56, wherein there is a plurality of such first at least partially light-transmissive parts.
- 71. (New) Apparatus according to claim 70, wherein there is a plurality of such second at least partially light-transmissive parts, each of which is



associated with a respective one of said first at least partially light-transmissive parts.

72. (New) Apparatus according to claim 71, including a plurality of such light-responsive detection means, wherein each of said light-responsive detection means receives light from a respective one of said second at least partially light-transmissive parts.
73. (New) Apparatus according to claim 70, wherein said pipe section is provided with means for flushing away deposits from each of said first and second at least partially light-transmissive parts inside the pipe section and wherein each of said first and second at least partially light-transmissive parts is associated with respective such flushing means.
74. (New) Apparatus according to claim 56, wherein there is a plurality of such light generating means.
75. (New) Apparatus according to claim 74, wherein only one of said light generating means is used at a time.
76. (New) Apparatus according to claim 74, wherein there is a plurality of such first at least partially light-transmissive parts and wherein each of said light generating means is associated with a respective one of said first at least partially light-transmissive parts.

77. (New) Apparatus according to claim 56, with said pipe section mounted in pipework for conveying the liquid flow, the processing means being located at a location remote therefrom and the coupling means coupling the processing means and the light-responsive detection means.
78. (New) Apparatus according to claim 77, wherein said pipework is for conveying water into a well in a hydrocarbon production system.
79. (New) Apparatus according to claim 78, wherein said pipe section, the first and second light-transmissive parts, the light generating means and the light-responsive means are sub-sea.
80. (New) Apparatus according to claim 79, wherein said remote location is a topside platform.
81. (New) Apparatus for use in monitoring particles in a liquid flow, comprising:  
a pipe section for receiving the liquid flow;  
  
light generating means adjacent the pipe section for transmitting light into the liquid flow via a first at least partially light-transmissive part of the pipe section;  
  
light-responsive detection means adjacent a second at least partially light-transmissive part of the pipe section for receiving light from the light generating means which has passed through the liquid flow;

processing means for location remotely from said pipe section; and

means for coupling the processing means with the detection means, the processing means being adapted for processing signals therefrom to provide data relating to particles in the liquid flow;

wherein the surface of said first at least partially light-transmissive part inside said pipe section is uneven for reducing deposit build-up on said surface.

- 82. (New) Apparatus according to claim 81, wherein said pipe section is provided with means for mounting it in a run of pipework.
- 83. (New) Apparatus according to claim 81, wherein said first and second at least partially light-transmissive parts comprise first and second windows in a wall of the pipe section.
- 84. (New) Apparatus according to claim 81, wherein said first and second at least partially light-transmissive parts are diametrically opposite each other.
- 85. (New) Apparatus according to claim 81, wherein inside said pipe section, each of said first and second at least partially light-transmissive parts has a non-stick coating.

86. (New) Apparatus according to claim 81, wherein said pipe section is provided with means for flushing away deposits from each of said first and second at least partially light-transmissive parts inside the pipe section.
87. (New) Apparatus according to claim 86, wherein said flushing means is located downstream of said first and second at least partially light-transmissive parts.
88. (New) Apparatus according to claim 86, wherein said flushing means comprises, for each of said first and second at least partially light-transmissive parts, a respective nozzle for directing a flushing liquid at the respective part from inside the pipe section.
89. (New) Apparatus according to claim 81, wherein said light-responsive detection means comprises a television camera.
90. (New) Apparatus according to claim 89, wherein said camera is provided with a lens and frame grabbing means for capturing one magnified single image at a time, focussed inside said pipe section, the signals received by said processing means representing successive captured images from said grabbing means.
91. (New) Apparatus according to claim 81, which is such that said processing means provides data relating to the amount and/or size distribution of particles of a predetermined kind in the liquid flow.

92. (New) Apparatus according to claim 81, including a plurality of such light-responsive detection means.
93. (New) Apparatus according to claim 92, which is such that only one of said light-responsive detection means is used at a time.
94. (New) Apparatus according to claim 92, wherein each of said light-responsive detection means receives light from said second at least partially light-transmissive part.
95. (New) Apparatus according to claim 81, wherein there is a plurality of such first at least partially light-transmissive parts.
96. (New) Apparatus according to claim 95, wherein there is a plurality of such second at least partially light-transmissive parts, each of which is associated with a respective one of said first at least partially light-transmissive parts.
97. (New) Apparatus according to claim 96, including a plurality of such light-responsive detection means, wherein each of said light-responsive detection means receives light from a respective one of said second at least partially light-transmissive parts.
98. (New) Apparatus according to claim 95, wherein said pipe section is provided

with means for flushing away deposits from each of said first and second at least partially light-transmissive parts inside the pipe section and wherein each of said first and second at least partially light-transmissive parts is associated with respective such flushing means.

99. (New) Apparatus according to claim 81, wherein there is a plurality of such light generating means.

100. (New) Apparatus according to claim 99, which is such that only one of said light generating means is used at a time.

101. (New) Apparatus according to claim 99, wherein there is a plurality of such first at least partially light-transmissive parts and wherein each of said light generating means is associated with a respective one of said first at least partially light-transmissive parts.

102. (New) Apparatus according to claim 81, with said pipe section mounted in pipework for conveying the liquid flow, the processing means being located at a location remote therefrom and the coupling means coupling the processing means and the light-responsive detection means.

103. (New) Apparatus according to claim 102, wherein said pipework is for conveying water into a well in a hydrocarbon production system.

104. (New) Apparatus according to claim 103, wherein said pipe section, the first

and second light-transmissive parts, the light generating means and the light-responsive means are sub-sea.

105. (New) Apparatus according to claim 104, wherein said remote location is a topside platform.